

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions of claims in the application:

Listing of Claims:

1. (Currently Amended) A system that optimizes industrial business operations, comprising:
a processor;
a memory communicatively coupled to the processor, the memory having stored therein computer-executable instructions configured to implement the industrial business operations including:
a component that receives data relating to a plurality of machines that are part of the industrial business operations;
a correlation engine that analyzes the data and correlates efficiency information for at least two of the plurality of machines to derive correlated system efficiency information; and
an optimization component that employs the correlated system efficiency information to select[[s]] an ~~desired~~ operating point as an optimum performance point within an allowable range of operation about a system ~~set point~~ setpoint ~~according to performance characteristic associated with the industrial business operations[[,]]~~ and controls the industrial business operations in part according to the ~~desired~~ operating point, the operating point selected to optimize a total energy utilization of the plurality of machines based on the correlated system efficiency information[[:]], and
~~a correlation engine that analyzes data to correlate operation among the plurality of machines for a global optimization of the industrial business operations as a whole.~~
2. (Currently Amended) The system of claim 1, further comprising a prognostics engine that ~~infers~~ generates an inference of a future state of a subset of operations for the plurality of machines based in part on received data. ~~host computer that executes the prognostic engine.~~

3. (Currently Amended) The system of claim 2 [[1]], the prognostic engine comprising a classifier.
4. (Currently Amended) The system of claim [[1]] 2, at least a subset of the plurality of machines comprising respective prognostic components that generate state information relating to at least one of historical, current, or predicted operating states of the respective machines, the prognostic components collaborate in a distributed manner share the state information with one another.
5. (Currently Amended) The system of claim 4, at least one of the ~~prognostics~~ prognostic components performs prognoses for a cluster of machines.
6. (Currently Amended) The system of claim 4, the prognosis prognostic engine and the prognostic components collaborating to ~~improve control an~~ improve control an operating rate of at least a subset of the plurality of machines.
7. (Original) The system of claim 3, the classifier performs a probabilistic analysis in connection with the inference.
8. (Currently Amended) The system of claim 1, at least a subset of the plurality of machines ~~and/or components~~ are respectively represented by intelligent agents that collaborate to determine at least one control modification of the plurality of machines that the total energy utilization for the plurality of machines.
9. (Currently Amended) The system of claim 1, at least a subset of the plurality of machines ~~and/or components~~ are physically located ~~remote~~ remotely from one another.

10. (Currently Amended) A method that optimizes assets in an industrial automation system environment, comprising:

employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

receiving and analyzing in real-time data relating to diagnoses and prognoses of operational aspects of a subset of machines that are part of the industrial automation system;

modeling and representing interactions of the subset of machines[.]] ~~for facilitating convergence on modification and control of the subset of machines;~~

modifying asset utilization in the industrial automation system ~~based at least in part~~ as a function of the analyzed diagnostic and prognostic machine data;

correlating efficiency information for at least two of ~~motor efficiency information, pump efficiency information, and motor drive efficiency information~~ the subset of machines to derive correlated system efficiency information ~~and optimize the entire industrial automation system as a whole;~~

selecting ~~an desired~~ operating point ~~as an optimum efficiency point~~ within an allowable range of operation about a system ~~set point~~ setpoint, the operating point selected to optimize a total cost of energy utilization of the subset of machines associated with the industrial automation system according to the correlated system efficiency information; and

controlling at least one machine according to the ~~desired~~ operating point.

11. (Cancelled)

12. (Original) The method of claim 10, further comprising employing an options based analysis in connection with asset management.

13. (Currently Amended) The method of claim 10, further comprising obtaining the system ~~set point~~ setpoint and the allowable range of operation ~~from a user via manual input.~~

14. (Cancelled)

15. (Currently Amended) The method of claim 10, wherein controlling the ~~industrial automation system~~ at least one machine according to the ~~desired~~ operating point comprises providing a motor speed signal to a motor drive ~~associated with the industrial automation system~~ according to the ~~desired~~ operating point.

16. (Currently Amended) The method of claim 10, further comprising obtaining at least one of the efficiency information, the allowable range, ~~and or~~ the system set-point setpoint ~~from a user via manual input.~~

17. (Currently Amended) The method of claim 10, further comprising obtaining at least one of the efficiency information, the allowable range, ~~and or~~ the system set-point setpoint from a host computer *via* a network.

18. (Cancelled)

19. (Currently Amended) The method of claim 17, wherein the at least one of the efficiency information, the allowable range, ~~and or~~ the system set-point setpoint is obtained *via* wireless communications.

20. (Currently Amended) The method of claim 10, further comprising obtaining at least a portion of one of the efficiency information, the allowable range, ~~and or~~ the set-point setpoint from prior operation of the system.

21. (Currently Amended) The method of claim 10, wherein the selecting the ~~desired~~ operating point comprises:

correlating component performance information associated with at least two components in the system in order to derive correlated system performance information; and

selecting the ~~desired~~ operating point ~~as the optimum efficiency performance point~~ within the allowable range of operation according to the correlated system performance information.

22. (Currently Amended) The method of claim 21, wherein ~~the controlling the industrial automation system at least one machine~~ according to the ~~desired~~ operating point comprises providing the ~~set-point~~ operating point to a controller associated with the industrial automation system ~~according to the desired operating point~~.
23. (Currently Amended) The method of claim 21, further comprising predicting a failure of at least one identified component of the subset of machines based on the correlated system efficiency information, and automatically ordering ~~an asset~~ a replacement for the identified component via the Internet[[.]] in response to predicting the failure.
24. (Currently Amended) The method of claim 21, further comprising obtaining at least one of the performance information, the allowable range, ~~and or~~ the system ~~set-point~~ setpoint from a host computer.
25. (Currently Amended) The method of claim 24, ~~wherein the~~ further comprising obtaining at least one of the performance information, the allowable range, ~~and or~~ the system ~~set-point~~ setpoint ~~is obtained via a network.~~
26. (Currently Amended) The method of claim 25, ~~wherein the~~ further comprising obtaining at least one of the performance information, the allowable range, ~~and or~~ the system ~~set-point~~ setpoint ~~is obtained via~~ wireless communications.
27. (Currently Amended) The method of claim 21, further comprising obtaining at least a portion of one of the performance information, the allowable range, ~~and or~~ the ~~set-point~~ setpoint from prior operation of the industrial automation system.
28. (Currently Amended) The method of claim 21, wherein the correlating the component performance information comprises correlating at least one of life cycle cost information, efficiency information, life expectancy information, safety information, emissions information, operational cost information, MTBF information, noise information, ~~and or~~ vibration information.

29. (Currently Amended) The method of claim 28, ~~wherein the industrial automation system comprises a motorized pump system for pumping fluid, having an electric motor operatively coupled with a pump, and a motor drive providing electrical power to the motor; wherein the~~ correlating the component performance information comprises correlating efficiency information related to at least two of the a motor, the a pump, and the or a motor drive[.]] ~~and wherein the correlated system performance information comprises to derive cost information related to the industrial automation system operational cost per unit of fluid pumped~~ through the pump.

30. (Currently Amended) The method of claim [[10]] 23, ~~further comprising; wherein the industrial automation system comprises a motorized pump system having an electric motor operatively coupled with a pump, and a motor drive providing electrical power to the motor, and wherein performance characteristics associated with a plurality of components in the industrial automation system comprises life expectancies of at least two of the motor, the pump, and the motor drive.~~

selecting, in response to predicting the failure, a new operating point calculated to maintain continued operation of the identified component until at least an anticipated arrival time of the replacement component; and

controlling at least one machine according to the new operating point.

31. (Currently Amended) The method of claim 10, ~~wherein the industrial automation system comprises a motorized pump system having an electric motor operatively coupled with a pump, and a motor drive providing electrical power to the motor, and wherein performance characteristics associated with a plurality of components in the industrial automation system comprises further comprising selecting the operating point to further optimize a cost of operation associated with at least two~~ one of the motor, the pump, and or the motor drive based on the correlated system efficiency information.

32. (Currently Amended) The method of claim 10, wherein the selecting the desired operating point comprises measuring at least one process variable from a sensor associated with the industrial automation system.

33. (Currently Amended) A system that optimizes assets in an industrial automation system, comprising:

processing means for processing data ~~form~~ from a memory having stored therein computer-executable instructions configured to implement the industrial business operations including:

means for receiving and analyzing in real-time data relating to prognoses of operational aspects of a plurality of machines ~~and/or business components~~ that are part of the industrial automation system;

means for modeling and representing interactions between the plurality of machines ~~and/or business components~~;

means for regulating a subset of the plurality of machines ~~and/or business components based at least in part~~ as a function of analyzed diagnostic and prognostic machine data;

means for correlating efficiency information for at least two of motor efficiency information, pump efficiency information, and motor drive efficiency information ~~the plurality of machines~~ in order to derive correlated system efficiency information ~~for optimizing an entire operation of the industrial automation system~~;

means for selecting an desired operating point within an allowable range of operation about a system ~~set point~~ setpoint according to the correlated system efficiency information, the operating point selected to optimize a total energy utilization of the industrial automation system; and

means for controlling at least one machine according to the desired operating point.

34. (Original) The system of claim 33 further comprising means for inferring future states of the subset of machines.

35. (Currently Amended) The system of claim 33 further comprising means for inferring future states of the a subset of business components.

36-38. (Cancelled)

39. (Currently Amended) An industrial automation ~~layout~~ control methodology, comprising: employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

~~analyzing machine related prognostic data to correlate operation among plurality of machines;~~

correlating efficiency information for at least two devices of a plurality of devices comprising an industrial control system to derive correlated system efficiency information;

analyzing business concern data;

analyzing ~~specifying~~ a business objective ~~data~~, the business objective including at least one of revenue generation or total energy utilization for the industrial control system; and

prescribing an operational setpoint for at least one of the plurality of devices that optimizes the specified business condition based on the correlated system efficiency information.

~~specifying machine acquisition based at least in part upon the analyses;~~

~~obtaining a system set point, an allowable range of operation and machine performance information;~~

~~selecting a desired operating point within the allowable range of operation about the system set point according to performance characteristics associated with at least one of the plurality of the machines; and~~

~~controlling at least one component according to the desired operating point for a global optimization of the plurality of machines as a whole.~~

40. (Currently Amended) A computer-implemented method for ordering parts and optimizing assets in an industrial automation system comprising:

employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

~~automatically receiving and analyzing data relating to a prognosis of a future state of the industrial automation system;~~

~~correlating component performance information for at least two devices operating within the industrial automation system;~~

~~deriving correlated process performance information based on the correlating;~~

~~automatically inferring a failure period for at least one part device [[of]] operating within the industrial automation system machine based on the correlated process performance information;~~

~~automatically ordering a replacement component for the at least one part device prior to an inferred failure period;~~

~~correlating component performance information associated with the industrial automation system in the machine comprising a motor efficiency information, a pump efficiency information, and a motor drive efficiency information in order to derive correlated process performance information for a performance optimization of the industrial automation system as a whole; and~~

~~selecting a desired operating point as an optimum performance point within an allowable range of operation according to the correlated process performance information;~~

~~selecting, in response to the inferring, an operating point calculated to maintain continued operation of the at least one device until at least an anticipated arrival time of the replacement component; and~~

~~controlling at least one machine in the industrial automation system according to the operating point.~~

41. (Original) The method of claim 40 further comprising employing an options based scheme in connection with machine management.

42. (Original) The method of claim 40 further comprising employing an options based scheme in connection with decision support.

43. (Original) The method of claim 40 further comprising employing an options based scheme in connection with asset optimization.

44. (Currently Amended) A system that facilitates optimizing industrial business operations, comprising:

a processor;

a memory communicatively coupled to the processor, the memory having stored therein computer-executable instructions configured to implement the industrial business operations including:

a component that receives data relating to a state of a subset of machines that are part of the industrial business operations and correlates efficiency information for at least two of the subset of machines to derive correlated system efficiency information;

a prognostics engine that infers a future state of at least a subset of the operations based in part on the received data, the prognostics engine comprising a plurality of intelligent software machine agents and business agents that serve as proxies for at least the subset of machines[[,]] ~~for modeling and representing interactions with one another, and for facilitating convergence on modification and control of the subset of machines;~~ and

an optimization component that selects an ~~desired~~ operating point ~~as an optimum performance point~~ within an allowable range of operation about a system set point ~~according to performance characteristic associated with at least one of the components in the system based on the correlated system efficiency information~~ and controls at least one component of the subset of machines according to the ~~desired~~ operating point, ~~for a performance optimization of the industrial automation system as a whole~~ the operating point selected to optimize a total energy utilization of the industrial business operations.

45. (Currently Amended) The system of claim 44, the prognostic engine infers at least one future business condition[[s]].

46. (Currently Amended) The system of claim 45, the at least one future business condition[[s]] comprising at least one of future raw materials ~~and~~ or future product demand.

47-49. (Cancelled)

50. (New) The system of claim 8, wherein the intelligent agents share energy utilization information, and control modes are assigned to the respective intelligent agents based on a comparison of the energy utilization information from the respective intelligent agents.

51. (New) The method of claim 40, further comprising:
detecting an updated anticipated arrival time for the replacement component;
selecting, in response to the detecting, a new operating point calculated to maintain continued operation of the at least one part until at least the updated anticipated arrival time; and
controlling the at least one machine in the industrial automation system according to the new operating point.

52. (New) The system of claim 1, wherein the plurality of machines comprise at least a motorized pump system having an electric motor operatively coupled with a pump, and a motor drive providing electrical power to the motor, and the correlation engine correlates efficiency information for at least two of the pump, the motor, or the motor drive.

53. (New) The method of claim 10, further comprising:
monitoring current energy costs; and
selecting the operating setpoint based at least in part on the current energy costs.